MiCOM P547

Phase Comparison Relay

P547/EN PM/N=<

Software Version 54

PICS and MICS

Schneider Electric

Note: The technical manual for this device gives instructions for its installation, commissioning, and operation. However, the manual cannot cover all conceivable circumstances or include detailed information on all topics. In the event of questions or specific problems, do not take any action without proper authorization. Contact the appropriate Schneider Electric technical sales office and request the necessary information.

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1 PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS)

1.1 Introduction

This specification is the Protocol Implementation Conformance Statement (PICS) and presents the ACSI conformance statements as defined in Annex A of Part 7-2 of the IEC 61850 standard specifications.

1.2 ACSI Basic Conformance Statement

The basic conformance statement is defined in Table 1.

		Client/ Subscriber		Server/ Publisher		Value/ Comments
Client-Server Roles						
B11	**Server** side (of two-party-application-association)	—	—	c1	Y	
B12	**Client** side (of two-party-application-association)	c1	N	—	—	
SCSMs Supported						
B21	**SCSM**: IEC 61850-8-1 used		N		Y	
B22	**SCSM**: IEC 61850-9-1 used		N		N	
B23	**SCSM**: IEC 61850-9-2 used		N		N	
B24	**SCSM**: Other					
Generic Substation Event Model (GSE)						
B31	**Publisher** side	—	—	O	Y	
B32	**Subscriber** side	O	Y	—	—	
Transmission of Sampled Value Model (SVC)						
B41	**Publisher** side	—	—	O	N	
B42	**Subscriber** side	O	N	—	—	

c1 - Shall be 'M' if support for **LOGICAL-DEVICE** model has been declared
O - Optional
M - Mandatory
Y - Yes (supported)
N - No (not supported)

Table 1 - Basic conformance statement

1.3 ACSI Models Conformance Statement

The ACSI models conformance statement is defined in Table 2.

		Client/ Subscriber		Server/ Publisher		Value/ Comments
If **Server** Side (B1) Supported						
M1	**Logical device**	c2	N	c2	Y	
M2	**Logical node**	c3	N	c3	Y	
M3	**Data**	c4	N	c4	Y	
M4	**Data set**	c5	N	c5	Y	
M5	**Substitution**	O	N	O	N	
M6	**Setting group control**	O	N	O	N	
	Reporting					
M7	**Buffered report control**	O	N	O	N	
M7-1	sequence-number					
M7-2	report-time-stamp					
M7-3	reason-for-inclusion					
M7-4	data-set-name					
M7-5	data-reference					
M7-6	buffer-overflow					
M7-7	entryID					
M7-8	BufTim					
M7-9	IntgPd					
M7-10	GI					
M8	**Unbuffered report control**	O	N	O	Y	
M8-1	sequence-number		N		Y	
M8-2	report-time-stamp		N		Y	
M8-3	reason-for-inclusion		N		Y	
M8-4	data-set-name		N		Y	
M8-5	data-reference		N		Y	
M8-6	BufTim		N		Y	
M8-7	IntgPd		N		Y	
M8-8	GI		N		Y	
	Logging	O	N	O	N	
M9	**Log control**	O	N	O	N	
M9-1	IntgPd		N		N	
M10	**Log**	O	N	O	N	
M11	**Control**	M	N	M	N	
If **GSE** (B31/32) is Supported						

		Client/ Subscriber		Server/ Publisher		Value/ Comments
	GOOSE	O	Y	O	Y	
M12-1	entryID		N		N	
M12-2	dataRefInc		N		N	
M13	**GSSE**	O	N	O	N	
If **SVC** (41/42) is Supported						
M14	Multicast SVC	O	N	O	N	
M15	Unicast SVC	O	N	O	N	
M16	**Time**	M	Y	M	N	Time source with required accuracy shall be available
M17	**File Transfer**	O	N	O	Y	

c2 - Shall be 'M' if support for **LOGICAL-NODE** model has been declared
c3 - Shall be 'M' if support for **DATA** model has been declared
c4 - Shall be 'M' if support for **DATA-SET**, Substitution, Report, Log Control, or Time model has been declared
c5 - Shall be 'M' if support for Report, GSE, or SMV models has been declared

Table 2 - ACSI models conformance statement

1.4 ACSI Service Conformance Statement

The ACSI service conformance statement is defined in Table 3 (depending on the statements in Table 1).

	Services	AA: TP/MC	Client/ Subscriber		Server/ Publisher		Comments
Server (clause 6)							
S1	ServerDirectory	TP		N	M	Y	
Application association (clause 7)							
S2	Associate		M	N	M	Y	
S3	Abort		M	N	M	Y	
S4	Release		M	N	M	Y	
Logical device (clause 8)							
S5	LogicalDeviceDirectory	TP	M	N	M	Y	
Logical node (clause 9)							
S6	LogicalNodeDirectory	TP	M	N	M	Y	
S7	GetAllDataValues	TP	O	N	M	Y	
Data (clause 10)							
S8	GetDataValues	TP	M	N	M	Y	
S9	SetDataValues	TP	O	N	O	Y	
S10	GetDataDirectory	TP	O	N	M	Y	
S11	GetDataDefinition	TP	O	N	M	Y	
Data set (clause 11)							

	Services	AA: TP/MC	Client/ Subscriber		Server/ Publisher		Comments
S12	GetDataSetValues	TP	O	N	M	Y	
S13	SetDataSetValues	TP	O	N	O	N	
S14	CreateDataSet	TP	O	N	O	N	
S15	DeleteDataSet	TP	O	N	O	N	
S16	GetDataSetDirectory	TP	O	N	O	Y	
Substitution (clause 12)							
S17	SetDataValues	TP	M	N	M	N	
Setting group control (clause 13)							
S18	SelectActiveSG	TP	O	N	O	N	
S19	SelectEditSG	TP	O	N	O	N	
S20	SetSGValues	TP	O	N	O	N	
S21	ConfirmEditSGValues	TP	O	N	O	N	
S22	GetSGValues	TP	O	N	O	N	
S23	GetSGCBValues	TP	O	N	O	N	
Reporting (clause 14)							
Buffered report control block (BRCB)							
S24	Report	TP	c6	N	c6	N	
S24-1	data-change (dchg)						
S24-2	qchg-change (qchg)						
S24-3	data-update (dupd)						
S25	GetBRCBValues	TP	c6	N	c6	N	
S26	SetBRCBValues	TP	c6	N	c6	N	
Unbuffered report control block (URCB)							
S27	Report	TP	c6	N	c6	Y	
S27-1	data-change (dchg)			N		Y	
S27-2	qchg-change (qchg)			N		N	
S27-3	data-update (dup			N		N	
S28	GetURCBValues	TP	c6	N	c6	Y	
S29	SetURCBValues	TP	c6	N	c6	Y	
c6 - Shall declare support for at least one (BRCB or URCB)							
Logging (clause 14)							
Log control block							
S30	GetLCBValues	TP	M	N	M	N	
S31	SetLCBValues	TP	O	N	M	N	
Log							
S32	QueryLogByTime	TP	c7	N	M	N	
S33	QueryLogAfter	TP	c7	N	M	N	
S34	GetLogStatusValues	TP	M	N	M	N	

	Services	AA: TP/MC	Client/ Subscriber		Server/ Publisher		Comments
c7 - Shall declare support for at least one (QueryLogByTime or QueryLogByEntry)							
Generic substation event model (GSE) (clause 14.3.5.3.4)							
GOOSE-CONTROL-BLOCK							
S35	SendGOOSEMessage	MC	c8	N	c8	Y	
S36	GetGoReference	TP	O	N	c9	Y	
S37	GetGOOSEElementNumber	TP	O	N	c9	Y	
S38	GetGoCBValues	TP	O	N	O	N	
S39	SetGoCBValues	TP	O	N	O	N	
GSSE-CONTROL-BLOCK							
S40	SendGSSEMessage	MC	c8	N	c8	N	
S41	GetGsReference	TP	O	N	c9	N	
S42	GetGSSEElementNumber	TP	O	N	c9	N	
S43	GetGsCBValues	TP	O	N	O	N	
S44	SetGsCBValues	TP	O	N	O	N	
c8 - Shall declare support for at least one (SendGOOSEMessage or SendGSSEMessage) c9 - Shall declare support if TP association is available							
Transmission of sampled value model (SVC) (clause 16)							
Multicast SVC							
S45	SendMSVMessage	MC	c10	N	c10	N	
S46	GetMSVCBValues	TP	O	N	O	N	
S47	SetMSVCBValues	TP	O	N	O	N	
Unicast SVC							
S48	SendUSVMessage	TP	c10	N	c10	N	
S49	GetUSVCBValues	TP	O	N	O	N	
S50	SetUSVCBValues	TP	O	N	O	N	
c10 - Shall declare support for at least one (SendMSVMessage or SendUSVMessage)							
Control (clause 17.5.1)							
S51	Select		M	N	O	N	
S52	SelectWithValue	TP	M	N	O	N	
S53	Cancel	TP	O	N	O	N	
S54	Operate	TP	M	N	M	N	
S55	Command-Termination	TP	M	N	O	N	
S56	TimeActivated-Operate	TP	O	N	O	N	
File transfer (clause 20)							
S57	GetFile	TP	O	N	M	Y	
S58	SetFile	TP	O	N	O	N	
S59	DeleteFile	TP	O	N	O	Y	
S60	GetFileAttributeValues	TP	O	N	M	Y	

	Services	AA: TP/MC	Client/ Subscriber	Server/ Publisher	Comments
Time (5.5)					
T1	Time resolution of internal clock			1ms	Nearest negative power of 2 in seconds
T2	Time accuracy of internal clock			1ms	T0
					T1
					T2
					T3
					T4
					T5
T3	Supported TimeStamp resolution			1ms	Nearest value of 2**-n in seconds according to 5.5.3.7.3.3

Table 3 - ACSI service conformance statement

2 MODEL IMPLEMENTATION CONFORMANCE STATEMENT (MICS)

2.1 Introduction

This specification is the Model Implementation Conformance Statement (MICS) and presents the top-level IEC 61850 data model that has been implemented. The definitions of all used Logical Nodes and their associated Common Data Classes, components and associated enumerated values are also included for completeness.

The reader is expected to be conversant with the terminology presented within the IEC 61850 part 7 series of specifications.

2.2 Objective

To provide comprehensive details of the standard data object model elements supported by the device. The MICS is conformant to the devices associated ICD (Substation Configuration Language) file, according to part 6 of the IEC 61850 standards. The layout of the presented tables within this document are conformant to the part 7 series of the IEC 61850 standard specifications with the following exceptions:

- The "Trigger Options" field is not presented
- The "M/O" field is not present as the definitions are as deployed within the model
- An additional column "X" is used to signify Schneider Electric custom attributes

2.3 Logical Device Definitions

The MiCOM relay implements an IEC 61850 server that can contain one or more Logical Devices. Each Logical Device contains a data model built from instances of specific Logical Nodes and must consist of at least an instance of the LPHD Logical Node (which is responsible for providing physical device information) and an instance of the LLN0 Logical Node (for addressing common issues across the Logical Device).

The IEC 61850 data model is contained within the Logical Devices detailed in the table below. All MiCOM devices will name the supported Logical Devices consistently to ensure that data model variables with the same purpose will have the same name within each MiCOM server.

Logical Device	Comment/Usage
Control	P547 Controls Domain
Measurements	P547 Measurements Domain
Protection	P547 Protection Domain
Records	P547 Records Domain
System	P547 System Domain

2.3.1 IEC 61850 Logical Device Data Model

The IEC 61850 Logical Device top-level data model consists of instances of Logical Nodes. The data model name for a Logical Node instance is constructed from an optional prefix (known as the wrapper), the Logical Node name, and an instance ID (or suffix).

The presented data model is in an alphabetically sorted order, rather than a logical order, because this is the natural order of the data when presented by a native MMS browser. (Higher level browsers can of course impart any ordering that they desire).

LD	LN Instance	LN Type	Description
Control			
	ArcRREC1	RREC_NO_SEG	Auto-Reclose
	AscRSYN1	RSYN_DIFCLC	System Checks - Check Sync 1
	AscRSYN2	RSYN_DIFCLC	System Checks - Check Sync 2
	LLN0	LLN0_CONTROL	Controls Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	OstRPSB1	RPSB_OST	Out of Step Tripping (Main Trip)
	OstRPSB2	RPSB_OST	Out of Step Tripping (Predictive Trip)
	PsbRPSB1	RPSB_BASIC	Zone 1 Ph/Gnd Power Swing Blocking
	PsbRPSB2	RPSB_BASIC	Zone 2 Ph/Gnd Power Swing Blocking
	PsbRPSB3	RPSB_BASIC	Zone 3 Ph/Gnd Power Swing Blocking
	PsbRPSB4	RPSB_BASIC	Zone 4 Ph/Gnd Power Swing Blocking
	PsbRPSB5	RPSB_BASIC	Zone P Ph/Gnd Power Swing Blocking
	XCBR1	XCBR_BASIC	Circuit Breaker Monitoring (Pole 1)
	XCBR2	XCBR_BASIC	Circuit Breaker Monitoring (Pole 2)
	XCBR3	XCBR_BASIC	Circuit Breaker Monitoring (Pole 3)
Measurements			
	FouMMXU1	MMXU_FOURIER	Fourier Measurements
	LLN0	LLN0_STANDARD	Measurements Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	MSQI1	MSQI_ALL	Sequence Measurements
	MSTA1	MSTA_I_W_VAR	Metering Statistics
	PhcMMXU1	MMXU_PHS_COMP	Phase Comparison Measurements
	RmsMMXU1	MMXU_RMS	RMS Measurements
	VolCmpMSQI1	MSQI_VOLTAGE	Compensated Overvoltage Measurements
Protection			
	CbfRBRF1	RBRF_EXTTRIP	CB Fail 1
	CbfRBRF2	RBRF_EXTTRIP	CB Fail 2
	DfpPFRC1	PFRC_NO_SEG	df/dt> 1 Frequency Rate of Change
	DfpPFRC2	PFRC_NO_SEG	df/dt> 2 Frequency Rate of Change
	DfpPFRC3	PFRC_NO_SEG	df/dt> 3 Frequency Rate of Change
	DfpPFRC4	PFRC_NO_SEG	df/dt> 4 Frequency Rate of Change
	DisPDIS1	PDIS_BASIC	Zone 1 Ph/Gnd Distance
	DisPDIS2	PDIS_BASIC	Zone 2 Ph/Gnd Distance
	DisPDIS3	PDIS_BASIC	Zone 3 Ph/Gnd Distance
	DisPDIS4	PDIS_BASIC	Zone 4 Ph/Gnd Distance
	DisPDIS5	PDIS_BASIC	Zone P Ph/Gnd Distance
	DisPSCH1	PSCH_BASIC	Distance Protection Scheme 1
	DisPSCH2	PSCH_BASIC	Distance Protection Scheme 2
	EfdPTOC1	PTOC_NEU	IN1> 1 Earth Fault (Derived)
	EfdPTOC2	PTOC_NEU	IN1> 2 Earth Fault (Derived)
	EfdPTOC3	PTOC_NEU	IN1> 3 Earth Fault (Derived)
	EfdPTOC4	PTOC_NEU	IN1> 4 Earth Fault (Derived)
	FrqPTOF1	PTOF_NO_SEG	F> 1 Over Frequency

LD	LN Instance	LN Type	Description
	FrqPTOF2	PTOF_NO_SEG	F> 2 Over Frequency
	FrqPTUF1	PTUF_NO_SEG	F< 1 Under Frequency
	FrqPTUF2	PTUF_NO_SEG	F< 2 Under Frequency
	FrqPTUF3	PTUF_NO_SEG	F< 3 Under Frequency
	FrqPTUF4	PTUF_NO_SEG	F< 4 Under Frequency
	LLN0	LLN0_PROT_PHS_ COMP	Protection LLNO for Phase Comparison With Distance
	LPHD1	LPHD_STANDARD	Physical Device Information
	NgcPTOC1	PTOC_NO_SEG	I2> 1 Negative Sequence
	NgcPTOC2	PTOC_NO_SEG	I2> 2 Negative Sequence
	NgcPTOC3	PTOC_NO_SEG	I2> 3 Negative Sequence
	NgcPTOC4	PTOC_NO_SEG	I2> 4 Negative Sequence
	OcpPTOC1	PTOC_SEG	I> 1 Overcurrent
	OcpPTOC2	PTOC_SEG	I> 2 Overcurrent
	OcpPTOC3	PTOC_SEG	I> 3 Overcurrent
	OcpPTOC4	PTOC_SEG	I> 4 Overcurrent
	PhcPDIF1	PDIF_PHS_COMP	Phase Comparison
	PTRC1	PTRC_NO_SEG	Protection Trip Conditioning
	SenEftPTOC1	PTOC_NEU	ISEF> 1 Sensitive Earth Fault
	SenEftPTOC2	PTOC_NEU	ISEF> 2 Sensitive Earth Fault
	SenEftPTOC3	PTOC_NEU	ISEF> 3 Sensitive Earth Fault
	SenEftPTOC4	PTOC_NEU	ISEF> 4 Sensitive Earth Fault
	SofPSOF1	PSOF_BASIC	Switch onto Fault protection
	ThmPTTR1	PTTR_NO_SEG	Thermal Overload
	TorPSOF1	PSOF_BASIC	Trip on Reclose Protection
	VtpCmpPTOV1	PTOV_NO_SEG	Compensated V1> 1 Overvoltage
	VtpCmpPTOV2	PTOV_NO_SEG	Compensated V1> 2 Overvoltage
	VtpPhsPTOV1	PTOV_SEG	V> 1 Overvoltage
	VtpPhsPTOV2	PTOV_SEG	V> 2 Overvoltage
	VtpPhsPTUV1	PTUV_SEG	V< 1 Undervoltage
	VtpPhsPTUV2	PTUV_SEG	V< 2 Undervoltage
	VtpResPTOV1	PTOV_NEU	VN> 1 Residual Overvoltage
	VtpResPTOV2	PTOV_NEU	VN> 2 Residual Overvoltage
Records			
	LLN0	LLN0_STANDARD	Records Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	RDRE1	RDRE_BASIC	Disturbance Recorder
	RFLO1	RFLO_BASIC	Fault Locator
System			
	AlmGGIO1	GGIO_ALM_96	Alarms
	FnkGGIO1	GGIO_IND_10	Function Keys
	GosGGIO1	GGIO_IND_32	GOOSE Input Signals
	GosGGIO2	GGIO_IND_32	GOOSE Output Signals
	LedGGIO1	GGIO_IND_18	Red LED Signals
	LedGGIO2	GGIO_IND_18	Green LED Signals

LD	LN Instance	LN Type	Description
	LLN0	LLN0_STANDARD	System Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	OptGGIO1	GGIO_IND_24	Opto (24) Inputs
	PloGGIO1	GGIO_IND_32	Controls
	RlyGGIO1	GGIO_IND_32	Output Contacts

2.4 Logical Node Definitions

The definition tables for each of the Logical Nodes in the top-level data model are presented in the following sub-sections.

The following table presents a summary of the Logical Node templates used across the Logical Devices within the overall IEC 61850 product data model:

LN Type	(LN Class)	Description	Name Space
GGIO_IND_10	(GGIO)	Generic Process I/O (w.r.t 10 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_18	(GGIO)	Generic Process I/O (w.r.t 18 Indication Elements)	IEC61850-7-4:2003
GGIO_IND_24	(GGIO)	Generic Process I/O (w.r.t 24 Indication Elements)	IEC61850-7-4:2003
GGIO_IND_32	(GGIO)	Generic Process I/O (w.r.t 32 Indication Elements)	IEC61850-7-4:2003
GGIO_ALM_96	(GGIO)	Generic Process I/O (w.r.t 96 Alarm Elements)	IEC61850-7-4:2003
LLN0_CONTROL	(LLN0)	Control Domain Logical Node 0	IEC61850-7-4:2003
LLN0_PROT_PHS_ COMP	(LLN0)	Protection LLN0 for Phase Comparison Relays	IEC61850-7-4:2003
LLN0_STANDARD	(LLN0)	General Logical Node 0	IEC61850-7-4:2003
LPHD_STANDARD	(LPHD)	Px40 Physical Device Information	IEC61850-7-4:2003
MMXU_RMS	(MMXU)	Standard Measurements (w.r.t RMS Values)	IEC61850-7-4:2003
MMXU_FOURIER	(MMXU)	Standard Measurements (w.r.t Fourier Values)	IEC61850-7-4:2003
MMXU_PHS_COMP	(MMXU)	Standard Measurements (w.r.t Phase Comparison)	IEC61850-7-4:2003
MSQI_ALL	(MSQI)	Sequence and Imbalance (w.r.t Pos, Neq, Zero)	IEC61850-7-4:2003
MSQI_VOLTAGE	(MSQI)	Sequence and Imbalance (w.r.t Pos, Neq, Zero Voltage only)	IEC61850-7-4:2003
MSTA_I_W_VAR	(MSTA)	Metering Statistics (w.r.t Current, Real + Reactive Power - Average + Max values)	IEC61850-7-4:2003
PDIF_PHS_COMP	(PDIF)	Differential (Phase Comparison)	IEC61850-7-4:2003
PDIS_BASIC	(PDIS)	Distance (w.r.t Mandatory Attributes Only)	IEC61850-7-4:2003
PFRC_NO_SEG	(PFRC)	Rate of Change of Frequency (w.r.t No Phase Segregation)	IEC61850-7-4:2003
PSCH_BASIC	(PSCH)	Protection Scheme (w.r.t Mandatory Attributes Only)	IEC61850-7-4:2003
PSOF_BASIC	(PSOF)	Switch-onto-Fault Protection	IEC61850-7-4:2003
PTOC_NEU	(PTOC)	Timed Overcurrent (w.r.t Neutral)	IEC61850-7-4:2003
PTOC_NO_SEG	(PTOC)	Timed Overcurrent (w.r.t No Phase Segregation)	IEC61850-7-4:2003
PTOC_SEG	(PTOC)	Timed Overcurrent (w.r.t Phase Segregation)	IEC61850-7-4:2003
PTOF_NO_SEG	(PTOF)	Over Frequency (w.r.t No Phase Segregation)	IEC61850-7-4:2003

LN Type	(LN Class)	Description	Name Space
PTOV_NEU	(PTOV)	Overvoltage (w.r.t Neutral)	IEC61850-7-4:2003
PTOV_NO_SEG	(PTOV)	Overvoltage (w.r.t No Phase Segregation)	IEC61850-7-4:2003
PTOV_SEG	(PTOV)	Overvoltage (w.r.t Phase Segregation)	IEC61850-7-4:2003
PTRC_NO_SEG	(PTRC)	Protection Trip Conditioning (w.r.t No Phase Segregation)	IEC61850-7-4:2003
PTTR_NO_SEG	(PTTR)	Thermal Overload (w.r.t No Phase Segregation)	IEC61850-7-4:2003
PTUF_NO_SEG	(PTUF)	Under Frequency (w.r.t No Phase Segregation)	IEC61850-7-4:2003
PTUV_SEG	(PTUV)	Undervoltage (w.r.t Phase Segregation)	IEC61850-7-4:2003
RBRF_EXTTRIP	(RBRF)	Breaker Failure (w.r.t External Tripping)	IEC61850-7-4:2003
RDRE_BASIC	(RDRE)	Disturbance Recorder Function (w.r.t Mandatory Attributes Only)	IEC61850-7-4:2003
RFLO_BASIC	(RFLO)	Fault Locator (w.r.t Mandatory Attributes Only)	IEC61850-7-4:2003
RPSB_BASIC	(RPSB)	Power Swing Detection/Blocking (w.r.t Mandatory Attributes Only)	IEC61850-7-4:2003
RPSB_OST	(RPSB)	Power Swing Blocking (w.r.t. Out Of Step Tripping)	IEC61850-7-4:2003
RREC_NO_SEG	(RREC)	Auto-Reclosing (w.r.t No Phase Segregation)	IEC61850-7-4:2003
RSYN_DIFCLC	(RSYN)	Synchronism-check/Synchronizing (w.r.t Calculated Differential Measurements)	IEC61850-7-4:2003
XCBR_BASIC	(XCBR)	Circuit Breaker (w.r.t Mandatory Attributes Only)	IEC61850-7-4:2003

2.4.1 Logical Node: GGIO_ALM_96

Description: Generic Process I/O (w.r.t 96 Alarm Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Alm1	SPS_D	General Single Alarm		
Alm2	SPS_D	General Single Alarm		
Alm3	SPS_D	General Single Alarm		
Alm4	SPS_D	General Single Alarm		
Alm5	SPS_D	General Single Alarm		
Alm6	SPS_D	General Single Alarm		
Alm7	SPS_D	General Single Alarm		
Alm8	SPS_D	General Single Alarm		
Alm9	SPS_D	General Single Alarm		
Alm10	SPS_D	General Single Alarm		
Alm11	SPS_D	General Single Alarm		
Alm12	SPS_D	General Single Alarm		
Alm13	SPS_D	General Single Alarm		
Alm14	SPS_D	General Single Alarm		
Alm15	SPS_D	General Single Alarm		

Attribute	Attr. Type	Explanation	T	X
Alm16	SPS_D	General Single Alarm		
Alm17	SPS_D	General Single Alarm		
Alm18	SPS_D	General Single Alarm		
Alm19	SPS_D	General Single Alarm		
Alm20	SPS_D	General Single Alarm		
Alm21	SPS_D	General Single Alarm		
Alm22	SPS_D	General Single Alarm		
Alm23	SPS_D	General Single Alarm		
Alm24	SPS_D	General Single Alarm		
Alm25	SPS_D	General Single Alarm		
Alm26	SPS_D	General Single Alarm		
Alm27	SPS_D	General Single Alarm		
Alm28	SPS_D	General Single Alarm		
Alm29	SPS_D	General Single Alarm		
Alm30	SPS_D	General Single Alarm		
Alm31	SPS_D	General Single Alarm		
Alm32	SPS_D	General Single Alarm		
Alm33	SPS_D	General Single Alarm		
Alm34	SPS_D	General Single Alarm		
Alm35	SPS_D	General Single Alarm		
Alm36	SPS_D	General Single Alarm		
Alm37	SPS_D	General Single Alarm		
Alm38	SPS_D	General Single Alarm		
Alm39	SPS_D	General Single Alarm		
Alm40	SPS_D	General Single Alarm		
Alm41	SPS_D	General Single Alarm		
Alm42	SPS_D	General Single Alarm		
Alm43	SPS_D	General Single Alarm		
Alm44	SPS_D	General Single Alarm		
Alm45	SPS_D	General Single Alarm		
Alm46	SPS_D	General Single Alarm		
Alm47	SPS_D	General Single Alarm		
Alm48	SPS_D	General Single Alarm		
Alm49	SPS_D	General Single Alarm		
Alm50	SPS_D	General Single Alarm		
Alm51	SPS_D	General Single Alarm		
Alm52	SPS_D	General Single Alarm		
Alm53	SPS_D	General Single Alarm		
Alm54	SPS_D	General Single Alarm		
Alm55	SPS_D	General Single Alarm		
Alm56	SPS_D	General Single Alarm		
Alm57	SPS_D	General Single Alarm		
Alm58	SPS_D	General Single Alarm		
Alm59	SPS_D	General Single Alarm		

Attribute	Attr. Type	Explanation	T	X
Alm60	SPS_D	General Single Alarm		
Alm61	SPS_D	General Single Alarm		
Alm62	SPS_D	General Single Alarm		
Alm63	SPS_D	General Single Alarm		
Alm64	SPS_D	General Single Alarm		
Alm65	SPS_D	General Single Alarm		
Alm66	SPS_D	General Single Alarm		
Alm67	SPS_D	General Single Alarm		
Alm68	SPS_D	General Single Alarm		
Alm69	SPS_D	General Single Alarm		
Alm70	SPS_D	General Single Alarm		
Alm71	SPS_D	General Single Alarm		
Alm72	SPS_D	General Single Alarm		
Alm73	SPS_D	General Single Alarm		
Alm74	SPS_D	General Single Alarm		
Alm75	SPS_D	General Single Alarm		
Alm76	SPS_D	General Single Alarm		
Alm77	SPS_D	General Single Alarm		
Alm78	SPS_D	General Single Alarm		
Alm79	SPS_D	General Single Alarm		
Alm80	SPS_D	General Single Alarm		
Alm81	SPS_D	General Single Alarm		
Alm82	SPS_D	General Single Alarm		
Alm83	SPS_D	General Single Alarm		
Alm84	SPS_D	General Single Alarm		
Alm85	SPS_D	General Single Alarm		
Alm86	SPS_D	General Single Alarm		
Alm87	SPS_D	General Single Alarm		
Alm88	SPS_D	General Single Alarm		
Alm89	SPS_D	General Single Alarm		
Alm90	SPS_D	General Single Alarm		
Alm91	SPS_D	General Single Alarm		
Alm92	SPS_D	General Single Alarm		
Alm93	SPS_D	General Single Alarm		
Alm94	SPS_D	General Single Alarm		
Alm95	SPS_D	General Single Alarm		
Alm96	SPS_D	General Single Alarm		

2.4.2 Logical Node: GGIO_IND_10

Description: Generic Process I/O (w.r.t 10 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		

Attribute	Attr. Type	Explanation	T	X
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General Indication		
Ind2	SPS_D	General Indication		
Ind3	SPS_D	General Indication		
Ind4	SPS_D	General Indication		
Ind5	SPS_D	General Indication		
Ind6	SPS_D	General Indication		
Ind7	SPS_D	General Indication		
Ind8	SPS_D	General Indication		
Ind9	SPS_D	General Indication		
Ind10	SPS_D	General Indication		

2.4.3 Logical Node: GGIO_IND_18

Description: Generic Process I/O (w.r.t 18 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General Indication		
Ind2	SPS_D	General Indication		
Ind3	SPS_D	General Indication		
Ind4	SPS_D	General Indication		
Ind5	SPS_D	General Indication		
Ind6	SPS_D	General Indication		
Ind7	SPS_D	General Indication		
Ind8	SPS_D	General Indication		
Ind9	SPS_D	General Indication		
Ind10	SPS_D	General Indication		
Ind11	SPS_D	General Indication		
Ind12	SPS_D	General Indication		
Ind13	SPS_D	General Indication		
Ind14	SPS_D	General Indication		
Ind15	SPS_D	General Indication		
Ind16	SPS_D	General Indication		
Ind17	SPS_D	General Indication		
Ind18	SPS_D	General Indication		

2.4.4 Logical Node: GGIO_IND_24

Description: Generic Process I/O (w.r.t 24 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General Indication		
Ind2	SPS_D	General Indication		
Ind3	SPS_D	General Indication		
Ind4	SPS_D	General Indication		
Ind5	SPS_D	General Indication		
Ind6	SPS_D	General Indication		
Ind7	SPS_D	General Indication		
Ind8	SPS_D	General Indication		
Ind9	SPS_D	General Indication		
Ind10	SPS_D	General Indication		
Ind11	SPS_D	General Indication		
Ind12	SPS_D	General Indication		
Ind13	SPS_D	General Indication		
Ind14	SPS_D	General Indication		
Ind15	SPS_D	General Indication		
Ind16	SPS_D	General Indication		
Ind17	SPS_D	General Indication		
Ind18	SPS_D	General Indication		
Ind19	SPS_D	General Indication		
Ind20	SPS_D	General Indication		
Ind21	SPS_D	General Indication		
Ind22	SPS_D	General Indication		
Ind23	SPS_D	General Indication		
Ind24	SPS_D	General Indication		

2.4.5 Logical Node: GGIO_IND_32

Description: Generic Process I/O (w.r.t 32 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General Indication		
Ind2	SPS_D	General Indication		
Ind3	SPS_D	General Indication		
Ind4	SPS_D	General Indication		
Ind5	SPS_D	General Indication		
Ind6	SPS_D	General Indication		
Ind7	SPS_D	General Indication		

Attribute	Attr. Type	Explanation	T	X
Ind8	SPS_D	General Indication		
Ind9	SPS_D	General Indication		
Ind10	SPS_D	General Indication		
Ind11	SPS_D	General Indication		
Ind12	SPS_D	General Indication		
Ind13	SPS_D	General Indication		
Ind14	SPS_D	General Indication		
Ind15	SPS_D	General Indication		
Ind16	SPS_D	General Indication		
Ind17	SPS_D	General Indication		
Ind18	SPS_D	General Indication		
Ind19	SPS_D	General Indication		
Ind20	SPS_D	General Indication		
Ind21	SPS_D	General Indication		
Ind22	SPS_D	General Indication		
Ind23	SPS_D	General Indication		
Ind24	SPS_D	General Indication		
Ind25	SPS_D	General Indication		
Ind26	SPS_D	General Indication		
Ind27	SPS_D	General Indication		
Ind28	SPS_D	General Indication		
Ind29	SPS_D	General Indication		
Ind30	SPS_D	General Indication		
Ind31	SPS_D	General Indication		
Ind32	SPS_D	General Indication		

2.4.6 Logical Node: LLN0_CONTROL

Description: Control Domain Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLN0	Name Plate		
AscMod	INC_MOD_D_PRIV	Check Synchronization		
AscBeh	INS_BEH_D_PRIV	Check Synchronization		
ArcMod	INC_MOD_D_PRIV	Auto-Reclose		
ArcBeh	INS_BEH_D_PRIV	Auto-Reclose		
PsbMod	INC_MOD_D_PRIV	Power Swing Blocking		
PsbBeh	INS_BEH_D_PRIV	Power Swing Blocking		

2.4.7 Logical Node: LLN0_PROT_PHS_COMP

Description: Protection LLN0 for Phase Comparison Relays

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLN0	Name Plate		
DisMod	INC_MOD_D_PRIV			
DisBeh	INS_BEH_D_PRIV			
PhcMod	INC_MOD_D_PRIV			
PhcBeh	INS_BEH_D_PRIV			
OcpMod	INC_MOD_D_PRIV			
OcpBeh	INS_BEH_D_PRIV			
NgcMod	INC_MOD_D_PRIV			
NgcBeh	INS_BEH_D_PRIV			
EfdMod	INC_MOD_D_PRIV			
EfdBeh	INS_BEH_D_PRIV			
SefMod	INC_MOD_D_PRIV			
SefBeh	INS_BEH_D_PRIV			
VtpMod	INC_MOD_D_PRIV			
VtpBeh	INS_BEH_D_PRIV			
NvdMod	INC_MOD_D_PRIV	Residual Overvoltage NVD Mode		
NvdBeh	INS_BEH_D_PRIV	Residual Overvoltage NVD Behavior		
FrqMod	INC_MOD_D_PRIV	Overfrequency/Underfrequency Mode		
FrqBeh	INS_BEH_D_PRIV	Overfrequency/Underfrequency Behavior		
DfpMod	INC_MOD_D_PRIV	df/dt Mode		
DfpBeh	INS_BEH_D_PRIV	df/dt Behavior		
ThmMod	INC_MOD_D_PRIV			
ThmBeh	INS_BEH_D_PRIV			
CbfMod	INC_MOD_D_PRIV			
CbfBeh	INS_BEH_D_PRIV			

2.4.8 Logical Node: LLN0_STANDARD

Description: General Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLN0	Name Plate		

2.4.9 Logical Node: LPHD_STANDARD

Description: Px40 Physical Device Information

LN Class: LPHD

Attribute	Attr. Type	Explanation	T	X
PhyNam	DPL_STANDARD	Physical Device Name Plate		
PhyHealth	INS_HEALTH	Physical Device Health		
Proxy	SPS_D	Indicates if This LN is a Proxy		
PwrUp	SPS_D	Power Up Detected		

2.4.10 Logical Node: MMXU_FOURIER

Description: Standard Measurements (w.r.t Fourier Values)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
TotW	MV_FLOAT	Total Active Power (Total P)		
TotVAr	MV_FLOAT	Total Reactive Power (Total Q)		
TotVA	MV_FLOAT	Total Apparent Power (Total S)		
TotPF	MV_FLOAT	Average Power Factor (Total PF)		
Hz	MV_FLOAT	Frequency		
PPV	DEL_SEG_ANG	Phase To Phase Voltages		
PhV	WYE_SEG_ANG_D	Phase To Ground Voltages		
A1	WYE_SEG_RES_D	Phase Currents (Fourier Magnitudes)		
A2	WYE_RES_ANG_D	Phase Currents (ISEF Magnitude)		
A3	WYE_RES_ANG_D	Phase Currents (Mutual Magnitude)		
W	WYE_SEG	Phase Active Power (P)		
VAr	WYE_SEG	Phase Reactive Power (Q)		
VA	WYE_SEG	Phase Apparent Power (S)		
PF	WYE_SEG	Phase Power Factor		

2.4.11 Logical Node: MMXU_PHS_COMP

Description: Standard Measurements (w.r.t Phase Comparison)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
A	WYE_SEG_ANG_D	Phase Currents		

2.4.12 Logical Node: MMXU_RMS

Description: Standard Measurements (w.r.t RMS Values)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
PhV	WYE_SEG_D	Phase to Ground Voltages		
A	WYE_SEG_D	Phase Currents		

2.4.13 Logical Node: MSQI_ALL

Description: Sequence and Imbalance (w.r.t Pos, Neq, Zero)

LN Class: MSQI

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SeqA	SEQ_MAG_ANG	Positive, Negative and Zero Sequence Current		
SeqV	SEQ_MAG_ANG	Positive, Negative and Zero Sequence Voltage		

2.4.14 Logical Node: MSQI_ VOLTAGE

Description: Sequence and Imbalance (w.r.t Pos, Neq, Zero Voltage only)

LN Class: MSQI

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SeqV	SEQ_MAG_ANG	Positive, Negative and Zero Sequence Voltage		

2.4.15 Logical Node: MSTA_I_W_VAR

Description: Metering Statistics (w.r.t Current, Real + Reactive Power - Average + Max Values)

LN Class: MSTA

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
AvAmps1	MV_FLOAT_D	Average Current		
AvAmps2	MV_FLOAT_D	Average Current		
AvAmps3	MV_FLOAT_D	Average Current		
AvAmps4	MV_FLOAT_D	Average Current		

Attribute	Attr. Type	Explanation	T	X
AvAmps5	MV_FLOAT_D	Average Current		
AvAmps6	MV_FLOAT_D	Average Current		
MaxAmps1	MV_FLOAT_D	Maximum Current		
MaxAmps2	MV_FLOAT_D	Maximum Current		
MaxAmps3	MV_FLOAT_D	Maximum Current		
AvW1	MV_FLOAT_D	Average Real Power		
AvW2	MV_FLOAT_D	Average Real Power		
MaxW	MV_FLOAT_D	Maximum Real Power		
AvVAr1	MV_FLOAT_D	Average Reactive Power		
AvVAr2	MV_FLOAT_D	Average Reactive Power		
MaxVAr	MV_FLOAT_D	Maximum Reactive Power		

2.4.16 Logical Node: PDIF_PHS_COMP

Description: Differential (Phase Comparison)

LN Class: PDIF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Op	ACT_SEG	Operate	T	

2.4.17 Logical Node: PDIS_BASIC

Description: Distance (w.r.t Mandatory Attributes Only)

LN Class: PDIS

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_SEG_NEU	Start		
Op	ACT_SEG_NEU	Operate	T	

2.4.18 Logical Node: PFRC_NO_SEG

Description: Rate of Change of Frequency (w.r.t No Phase Segregation)

LN Class: PFRC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		

Attribute	Attr. Type	Explanation	T	X
Op	ACT_NO_SEG	Operate	T	

2.4.19 Logical Node: PSCH_BASIC

Description: Protection Scheme (w.r.t Mandatory Attributes only)

LN Class: PSCH

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
ProTx	SPS_WD	Teleprotection Signal Transmitted	T	
ProRx	SPS_WD	Teleprotection Signal Received	T	
Str	ACD_NO_SEG	Carrier Send		
Op	ACT_SEG_NEU	Operate	T	
CarRx	ACT_NO_SEG	Carrier Received After Unblock Logic		
LosOfGrd	SPS_WD	Loss of Guard		
WeiOp	ACT_SEG	Operate Signal from Weak End Infeed Function		

2.4.20 Logical Node: PSOF_BASIC

Description: Switch-onto-Fault Protection

LN Class: PSOF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN_PRIV	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.21 Logical Node: PTOC_NEU

Description: Timed Overcurrent (w.r.t Neutral)

LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NEU	Start		
Op	ACT_NEU	Operate	T	

2.4.22 Logical Node: PTOC_NO_SEG

Description: Timed Overcurrent (w.r.t No Phase Segregation)

LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.23 Logical Node: PTOC_SEG

Description: Timed Overcurrent (w.r.t Phase Segregation)

LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

2.4.24 Logical Node: PTOF_NO_SEG

Description: Over Frequency (w.r.t No Phase Segregation)

LN Class: PTOF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.25 Logical Node: PTOV_NEU

Description: Overvoltage (w.r.t Neutral)

LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NEU	Start		
Op	ACT_NEU	Operate	T	

2.4.26 Logical Node: PTOV_NO_SEG

Description: Overvoltage (w.r.t No Phase Segregation)

LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.27 Logical Node: PTOV_SEG

Description: Overvoltage (w.r.t Phase Segregation)

LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

2.4.28 Logical Node: PTRC_NO_SEG

Description: Protection Trip Conditioning (w.r.t No Phase Segregation)

LN Class: PTRC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Tr	ACT_NO_SEG	Trip		
Str	ACD_NO_SEG	Sum of All Starts of All Connected Logical Nodes		

2.4.29 Logical Node: PTTR_NO_SEG

Description: Thermal Overload (w.r.t No Phase Segregation)

LN Class: PTTR

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Amp	MV_FLOAT	Current for Thermal Load Model		
TmpRl	MV_FLOAT	Relation Between Temperature and Maximum Temperature		
Op	ACT_NO_SEG	Operate	T	

Attribute	Attr. Type	Explanation	T	X
AlmThm	ACT_NO_SEG	Thermal Alarm	T	

2.4.30 Logical Node: PTUF_NO_SEG

Description: Under Frequency (w.r.t No Phase Segregation)

LN Class: PTUF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.31 Logical Node: PTUV_SEG

Description: Undervoltage (w.r.t Phase Segregation)

LN Class: PTUV

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

2.4.32 Logical Node: RBRF_EXTTRIP

Description: Breaker Failure (w.r.t External Tripping)

LN Class: RBRF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
OpEx	ACT_NO_SEG	Breaker Failure Trip ("External Trip")	T	

2.4.33 Logical Node: RDRE_BASIC

Description: Disturbance Recorder Function (w.r.t Mandatory Attributes Only)

LN Class: RDRE

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		

Attribute	Attr. Type	Explanation	T	X
RcdMade	SPS_WD	Recording Made		
FltNum	INS_BASIC	Fault Number		

2.4.34 Logical Node: RFLO_BASIC

Description: Fault Locator (w.r.t Mandatory Attributes Only)

LN Class: RFLO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
FltZ	CMV_MAG_FLOAT	Fault Impedance		
FltDiskm	MV_FLOAT	Fault Distance in km		

2.4.35 Logical Node: RPSB_BASIC

Description: Power Swing Detection/Blocking (W.R.T Mandatory Attributes Only)

LN Class: RPSB

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start (Power Swing Detected)		
BlkZn	SPS_WD	Blocking of Correlated PDIS Zone		

2.4.36 Logical Node: RPSB_OST

Description: Power Swing Blocking (w.r.t Out Of StepTripping)

LN Class: RPSB

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Op	ACT_NO_SEG	Operate (Out of Step Tripping)		

2.4.37 Logical Node: RREC_NO_SEG

Description: Auto-Reclosing (w.r.t No Phase Segregation)

LN Class: RREC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Op	ACT_NO_SEG	Operate (Used Here to Provide Close to XCBR)	T	
AutoRecSt	INS_AR_STATE	Auto-Reclosing Status		

2.4.38 Logical Node: RSYN_DIFCLC

Description: Synchronism-check/Synchronizing (w.r.t Calculated Differential Measurements)

LN Class: RSYN

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Rel	SPS_WD	Release		
DifHzClc	MV_FLOAT	Calculated Difference in Frequency		
DifAngClc	MV_FLOAT	Calculated Difference of Phase Angle		

2.4.39 Logical Node: XCBR_BASIC

Description: Circuit Breaker (w.r.t Mandatory Attributes Only)

LN Class: XCBR

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Loc	SPS_WD	Local Operation		
EEHealth	INS_HEALTH	External Equipment Health		
OpCnt	INS_BASIC	Operation Counter		
Pos	DPC_STATUS	Switch Position		
BlkOpn	SPC_STATUS	Block Opening		
BlkCls	SPC_STATUS	Block Closing		

2.5 Common Data Class Definitions

The definition tables for each of the Common Data Classes used in the Logical Node definitions are presented in the following sub-sections.

From an application point-of-view the data attributes of a Common Data Class are classified according to their specific use. The characterization of data attributes, and the services that they support/provide, will be through the use of 'Functional Constraints'. The Functional Constraints are specified by the table below:

FC Name	Semantic	Source Definition
BR	Buffered Reports	IEC61850-7-2
CF	Configuration	IEC61850-7-2
CO	Control	IEC61850-7-2
DC	Description	IEC61850-7-2
EX	Extended Definition	IEC61850-7-2
GO	GOOSE Control	IEC61850-7-2
GS	GSSE Control (UCA2 GOOSE)	IEC61850-7-2
LG	Logging	IEC61850-7-2
MS	Multicast Sampled Value Control	IEC61850-7-2
MX	Measurands (Analogue Values)	IEC61850-7-2
RP	Unbuffered Reports	IEC61850-7-2
SE	Setting Group Editable	IEC61850-7-2
SG	Setting Group	IEC61850-7-2
SP	Set Point	IEC61850-7-2
ST	Status Information	IEC61850-7-2
SV	Substitution Values	IEC61850-7-2
US	Unicast Sampled Value Control	IEC61850-7-2
XX	Data Attribute Service Parameters	IEC61850-7-2

2.5.1 Common Data Class: ACD_NEU

Description: Directional Protection Activation Information (w.r.t Neutral)

CDC Class: ACD

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
dirGeneral	ENUMERATED8 (MMS Type: INT8)	ST	dir	General direction (unknown, forward, backward or both)	
neut	BOOLEAN	ST		Trip or start event with earth current has happened	
dirNeut	ENUMERATED8 (MMS Type: INT8)	ST	dir	Earth current direction (unknown, forward or backward)	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

2.5.2 Common Data Class: ACD_NO_SEG

Description: Directional Protection Activation Information (w.r.t No Phase Segregation)

CDC Class: ACD

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
dirGeneral	ENUMERATED8 (MMS Type: INT8)	ST	dir	General direction (unknown, forward, backward or both)	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

2.5.3 Common Data Class: ACD_SEG

Description: Directional Protection Activation Information (w.r.t Phase Segregation)

CDC Class: ACD

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
dirGeneral	ENUMERATED8 (MMS Type: INT8)	ST	dir	General direction (unknown, forward, backward or both)	
phsA	BOOLEAN	ST		Trip or start event of Phase A has happened	
dirPhsA	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase A direction (unknown, forward or backward)	
phsB	BOOLEAN	ST		Trip or start event of Phase B has happened	
dirPhsB	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase B direction (unknown, forward or backward)	
phsC	BOOLEAN	ST		Trip or start event of Phase C has happened	
dirPhsC	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase C direction (unknown, forward or backward)	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

2.5.4 Common Data Class: ACD_SEG_NEU

Description: Directional Protection Activation Information (w.r.t Phase Segregation + Neutral)

CDC Class: ACD

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
dirGeneral	ENUMERATED8 (MMS Type: INT8)	ST	dir	General direction (unknown, forward, backward or both)	
phsA	BOOLEAN	ST		Trip or start event of Phase A has happened	

Attribute	Type	FC	Enumeration	Comment	X
dirPhsA	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase A direction (unknown, forward or backward)	
phsB	BOOLEAN	ST		Trip or start event of Phase B has happened	
dirPhsB	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase B direction (unknown, forward or backward)	
phsC	BOOLEAN	ST		Trip or start event of Phase C has happened	
dirPhsC	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase C direction (unknown, forward or backward)	
neut	BOOLEAN	ST		Trip or start event with earth current has happened	
dirNeut	ENUMERATED8 (MMS Type: INT8)	ST	dir	Earth current direction (unknown, forward or backward)	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

2.5.5 Common Data Class: ACT_NEU

Description: Protection Activation Information (w.r.t Neutral)

CDC Class: ACT

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
neut	BOOLEAN	ST		Trip or start event with earth current has happened	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

2.5.6 Common Data Class: ACT_NO_SEG

Description: Protection Activation Information (w.r.t No Phase Segregation)

CDC Class: ACT

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

2.5.7 Common Data Class: ACT_SEG

Description: Protection Activation Information (w.r.t Phase Segregation)

CDC Class: ACT

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
phsA	BOOLEAN	ST		Trip or start event of Phase A has happened	
phsB	BOOLEAN	ST		Trip or start event of Phase B has happened	
phsC	BOOLEAN	ST		Trip or start event of Phase C has happened	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

2.5.8 Common Data Class: ACT_SEG_NEU

Description: Protection Activation Information (w.r.t Phase Segregation + Neutral)

CDC Class: ACT

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
phsA	BOOLEAN	ST		Trip or start event of Phase A has happened	
phsB	BOOLEAN	ST		Trip or start event of Phase B has happened	
phsC	BOOLEAN	ST		Trip or start event of Phase C has happened	
neut	BOOLEAN	ST		Trip or start event with earth current has happened	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

2.5.9 Common Data Class: CMV_MAG_ANG_FLOAT

Description: Complex Measured Value (w.r.t Floating Point Magnitude and Angle)

CDC Class: CMV

Attribute	Type	FC	Enumeration	Comment	X
cVal	Vector_Magnitude Angle_Float	MX		Deadbanded complex measured vector. Updated to the current value of instCVal when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_No_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	

2.5.10 Common Data Class: CMV_MAG_FLOAT

Description: Complex Measured Value (w.r.t Floating Point Magnitude)

CDC Class: CMV

Attribute	Type	FC	Enumeration	Comment	X
cVal	Vector_Magnitude_ Float	MX		Deadbanded complex measured vector. Updated to the current value of instCVal when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_No_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	

2.5.11 Common Data Class: DEL_SEG_ANG

Description: Phase to Phase Measurements For A 3-Phase System (w.r.t Phase Segregation + Angle)

CDC Class: DEL

Attribute	Type	FC	Enumeration	Comment	X
phsAB	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase A to Phase B	
phsBC	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase B to Phase C	
phsCA	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase C to Phase A	

2.5.12 Common Data Class: DPC_STATUS

Description: Controllable Double Point (w.r.t Status Only)

CDC Class: DPC

Attribute	Type	FC	Enumeration	Comment	X
stVal	CODED_ENUM (MMS Type: _BSTR2)	ST	Dbpos	Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (corresponding to the behavior of the data)	

2.5.13 Common Data Class: DPL_STANDARD

Description: Standard Device Name Plate

CDC Class: DPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	
hwRev	VISIBLE_STRING255	DC		Hardware revision	
swRev	VISIBLE_STRING255	DC		Software revision	
serNum	VISIBLE_STRING255	DC		Serial Number	
model	VISIBLE_STRING255	DC		Model Number	
location	VISIBLE_STRING255	DC		Physical location of device	

2.5.14 Common Data Class: INC_MOD

Description: Controllable Integer Status (w.r.t Mode)

CDC Class: INC

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Mod	Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (corresponding to the behavior of the data)	

2.5.15 Common Data Class: INC_MOD_D_PRIV

Description: Controllable Integer Status (w.r.t Mode, with Description (Private DO))

CDC Class: INC

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Mod	Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (corresponding to the behavior of the data)	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.16 Common Data Class: INS_AR_STATE

Description: Integer Status (w.r.t Auto-Reclose Status)

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	AutoRecSt	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

2.5.17 Common Data Class: INS_BASIC

Description: Integer Status (w.r.t Mandatory Options Only)

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32	ST		The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

2.5.18 Common Data Class: INS_BEH

Description: Integer Status (w.r.t Behavior)

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Beh	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

2.5.19 Common Data Class: INS_BEH_D_PRIV

Description: Integer Status (w.r.t Behavior, with Description (Private DO))

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Beh	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.20 Common Data Class: INS_HEALTH

Description: Integer Status (w.r.t Health)

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Health	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

2.5.21 Common Data Class: LPL_LLN0

Description: Logical Node 0 Name Plate

CDC Class: LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	

Attribute	Type	FC	Enumeration	Comment	X
swRev	VISIBLE_STRING255	DC		Software revision	
d	VISIBLE_STRING255	DC		Description	
configRev	VISIBLE_STRING255	DC		Uniquely identifies the configuration of a local device instance	
ldNs	VISIBLE_STRING255	EX		Logical device name space	

2.5.22 Common Data Class: LPL_LN

Description: Standard Logical Node Name Plate

CDC Class: LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	
swRev	VISIBLE_STRING255	DC		Software revision	
d	VISIBLE_STRING255	DC		Description	

2.5.23 Common Data Class: LPL_LN_PRIV

Description: Logical Node Name Plate (w.r.t Schneider Electric Extended)

CDC Class: LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	
swRev	VISIBLE_STRING255	DC		Software revision	
d	VISIBLE_STRING255	DC		Description	
lnNs	VISIBLE_STRING255	EX		Logical node name space	

2.5.24 Common Data Class: MV_FLOAT

Description: Measured Value (w.r.t Floating Point Value)

CDC Class: LPL

Attribute	Type	FC	Enumeration	Comment	X
mag	AnalogueValue_Float	MX		Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_No_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	

2.5.25 Common Data Class: MV_FLOAT_D

Description: Measured Value (w.r.t Floating Point Value with Description)

CDC Class: MV

Attribute	Type	FC	Enumeration	Comment	X
mag	AnalogueValue_Float	MX		Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_No_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
d	VISIBLE_STRING255	DC		Description of the status element	

2.5.26 Common Data Class: SEQ_MAG_ANG

Description: Sequence Components of a Measurement Value (w.r.t Magnitudes + Angles)

CDC Class: SEQ

Attribute	Type	FC	Enumeration	Comment	X
c1	CMV_MAG_ANG_FLOAT	--		Sequence component 1 (For semantic meaning see seqT)	
c2	CMV_MAG_ANG_FLOAT	--		Sequence component 2 (For semantic meaning see seqT)	
c3	CMV_MAG_ANG_FLOAT	--		Sequence component 3 (For semantic meaning see seqT)	
seqT	ENUMERATED8 (MMS Type: INT8)	MX	seqT	Sequence quantity measurement type (Pos-Neg-Zero or Dir-Quad-Zero)	

2.5.27 Common Data Class: SPC_STATUS

Description: Controllable Single Point (w.r.t Status Only)

CDC Class: SPC

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (corresponding to the behavior of the data)	

2.5.28 Common Data Class: SPS_D

Description: Standard Single Point Status (with Description)

CDC Class: SPS

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		The element status (TRUE or FALSE)	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
d	VISIBLE_STRING255	DC		Description of the status element	

2.5.29 Common Data Class: SPS_WD

Description: Single Point Status (without Description)

CDC Class: SPS

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		The element status (TRUE or FALSE)	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

2.5.30 Common Data Class: WYE_RES_ANG_D

Description: Phase to Ground Measurements for A 3-Phase System (w.r.t Residual + Description + Angle)

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
res	CMV_MAG_ANG_FLOAT	--		Measurement values for the residual system current	
d	VISIBLE_STRING255	DC		Description of the status element	

2.5.31 Common Data Class: WYE_SEG

Description: Phase to Ground Measurements for a 3-Phase System (w.r.t Phase Segregation)

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_FLOAT	--		Measurement values for Phase A	
phsB	CMV_MAG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_FLOAT	--		Measurement values for Phase C	

2.5.32 Common Data Class: WYE_SEG_ANG_D

Description: Phase to Ground Measurements for a 3-Phase System

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase A	

Attribute	Type	FC	Enumeration	Comment	X
phsB	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase C	
d	VISIBLE_STRING255	DC		Description of the status element	

2.5.33 Common Data Class: WYE_SEG_D

Description: Phase to Ground Measurements for a 3-Phase System (w.r.t Phase Segregation + Description)

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_FLOAT	--		Measurement values for Phase A	
phsB	CMV_MAG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_FLOAT	--		Measurement values for Phase C	
d	VISIBLE_STRING255	DC		Description of the status element	

2.5.34 Common Data Class: WYE_SEG_RES_D

Description: Phase to Ground Measurements for a 3-Phase System (w.r.t Phase Segregation + Residual + Description)

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase A	
phsB	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase C	
neut	CMV_MAG_ANG_FLOAT	--		Measurement values for neutral input	
d	VISIBLE_STRING255	DC		Description of the status element	

2.6 Common Data Attribute Type Definitions

Common data attribute types, known herein as components, are defined for use in the Common Data Classes defined in the sections above.

2.6.1 Component: AnalogueValue_Float

Comment: General Analogue Value (w.r.t Floating Point Value)

Parent Type: AnalogueValue

Attribute	Type	Enumeration	Comment	X
f	FLOAT32		Floating point value	

2.6.2 Component: Unit_No_Multiplier

Comment: SI Unit Definitions

Parent Type: Unit

Attribute	Type	Enumeration	Comment	X
SIUnit	ENUMERATED8	SIUnit	SI Unit	

2.6.3 Component: Vector_Magnitude_Float

Comment: Complex Vector (w.r.t Floating Point Magnitude Value)

Parent Type: Vector

Attribute	Type	Enumeration	Comment	X
mag	AnalogueValue_Float		The magnitude of the complex value	

2.6.4 Component: Vector_MagnitudeAngle_Float

Comment: Complex Vector (w.r.t Floating Point Magnitude and Angle Values)

Parent Type: Vector

Attribute	Type	Enumeration	Comment	X
mag	AnalogueValue_Float		The magnitude of the complex value	
ang	AnalogueValue_Float		The angle of the complex value (the unit is degrees)	

2.7 Enumerated Type Definitions

The following sub-sections specify the enumerations that are associated to some Common Data Class attributes. The definition of the enumerations are according to IEC 61850-7-3 and IEC 61850-7-4 unless otherwise stated.

2.7.1 Enumerated Type: AutoRecSt

Description: Auto-Reclose Status

Ordinal	Semantic
1	Ready
2	InProgress
3	Successful
4	Unsuccessful

2.7.2 Enumerated Type: Beh

Description: Behavior

Ordinal	Semantic
1	On
2	Blocked
3	Test
4	Test/Blocked
5	Off

2.7.3 Enumerated Type: ctlModel

Description: Control Model

Ordinal	Semantic
0	Status only
1	Direct with normal security
2	SBO with normal security
3	Direct with enhanced security
4	SBO with enhanced security

2.7.4 Enumerated Type: Dbpos

Description: Switch Positions

Ordinal	Semantic
0	Intermediate
1	Off
2	On
3	Bad

2.7.5 Enumerated Type: dir

Description: Direction

Ordinal	Semantic
0	Unknown

Ordinal	Semantic
1	Forward
2	Backward
3	Both

2.7.6 Enumerated Type: Health

Description: Health

Ordinal	Semantic
1	OK
2	Warning
3	Alarm

2.7.7 Enumerated Type: Mod

Description: Mode

Ordinal	Semantic
1	On
2	Blocked
3	Test
4	Test/Blocked
5	Off

2.7.8 Enumerated Type: seqT

Description: Sequence Measurement Type

Ordinal	Semantic
0	Pos_Neg_Zero
1	Dir_Quad_Zero

2.7.9 Enumerated Type: SIUnit

Description: SI Units Derived from ISO/IEC 1000

Ordinal	Semantic
-16	years
-15	months
-14	weeks
-13	V/s
-12	mins
-11	hours
-10	days
-9	°F
-8	ratio
-7	miles
-6	inches
-5	feet
-4	df/dt
-3	Hz/s

Ordinal	Semantic
31	J
32	N
33	Hz
34	lx
35	Lm
36	Wb
37	T
38	W
39	Pa
41	m^2
42	m^3
43	m/s
44	m/s^2
45	m^3/s

Ordinal	Semantic
-2	%
-1	pu
1	none
2	m
3	kg
4	s
5	A
6	K
7	mol
8	cd
9	deg
10	rad
11	sr
21	Gy
22	q
23	°C
24	Sv
25	F
26	C
27	S
28	H
29	V
30	ohm

Ordinal	Semantic
46	m/m^3
47	M
48	kg/m^3
49	m^2/s
50	W/m K
51	J/K
52	ppm
53	1/s
54	rad/s
61	VA
62	Watts
63	VAr
64	theta
65	cos(theta)
66	Vs
67	V^2
68	As
69	A^2
70	A^2t
71	VAh
72	Wh
73	VArh
74	V/Hz

2.8 MMS Data-Type Conversions

The following table shows the relationships between the Part 7 and Part 8-1 data types. The definitions presented above use Part 7 data types, however these are subject to 'translation' when exposed over an MMS (Part 8-1) interface:

Part 7 Type	MMS Type	Part 7 Description
BOOLEAN	Bool	Logical TRUE/FALSE value
BVstring13	BVstring13	Variable bit string (upto 13 bits)
CODED_ENUM	Byte	Coded enumeration
CODED_ENUM2	Byte	Coded enumeration (2)
EntryTime	Btime6	8.1 Section 8.1.3.7
ENUMERATED16	Short	16 bit enumerated value
ENUMERATED8	Byte	8 bit enumerated value
FLOAT32	Float	32 bit floating point value
FLOAT64	Double	64 bit floating point value
INT128	Long	128 bit signed integer value
INT16	Short	16 bit signed integer value
INT16U	Ushort	16 bit unsigned integer value
INT24U	Ulong	24 bit unsigned integer value
INT32	Long	32 bit signed integer value
INT32U	Ulong	32 bit unsigned integer value
INT8	Byte	8 bit signed integer value
INT8U	Ubyte	8 bit unsigned integer value
OCTET_STRING6	Ostring6	6 character string (8 bits per character)
OCTET_STRING64	Ostring64	64 character string (8 bits per character)
OCTET_STRING8	Ostring8	8 character string (8 bits per character)
Quality	BVstring13	IEC 61850 Quality
TimeStamp	Utctime	IEC 61850 Time stamp
UNICODE_STRING255	UTF8Vstring255	255 character string (16 bits per unicode character)
UTC_TM	Utctime	UTC Timestamp
VISIBLE_STRING255	Vstring255	255 character string
VISIBLE_STRING64	Vstring64	64 character string
VISIBLE_STRING65	Vstring65	65 character string
VISIBLE_STRING97	Vstring97	97 character string

Customer Care Centre

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Publication: P547/EN PM/C21

Publisher: Schneider Electric

June 2011